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Cities and Growth: Moving to Toronto – Income Gains Associated with Large Metropolitan Labour Markets

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Statistics Canada
Economic Analysis Division

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Symbols

The following standard symbols are used in Statistics Canada publications:

.	not available for any reference period
..	not available for a specific reference period
...	not applicable
0	true zero or a value rounded to zero
0^s	value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
^{p}	preliminary
^{r}	revised
x	suppressed to meet the confidentiality requirements of the *Statistics Act*
^{E}	use with caution
F	too unreliable to be published
*	significantly different from reference category ($p < 0.05$)

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Abstract

This paper examines the process by which migrants experience gains in earnings subsequent to migration and, in particular, the advantage that migrants obtain from moving to large, dynamic metropolitan labour markets, using Toronto as a benchmark. There are two potentially distinct patterns to gains in earnings associated with migration. The first is a step upwards in which workers realize immediate gains in earnings subsequent to migration. The second is accelerated gains in earnings subsequent to migration. Immediate gains are associated with obtaining a position in a more productive firm and/or a better match between worker skills and abilities and job tasks. Accelerated gains in earnings are associated processes that take time, such as learning or job switching as workers and firms seek out better matches. Evaluated here is the expectation that the economies of large metropolitan areas provide workers with an initial productive advantage stemming from a one-time improvement in worker productivity and/or a dynamic that accelerates gains in earnings over time through the potentially entwined processes of learning and matching. A variety of datasets and methodologies, including propensity score matching, are used to evaluate patterns of income gains associated with migration to Toronto.

More studies related to **economic geography** are available in **Update on Economical analysis** (www.statcan.gc.ca/economicanalysis).

Executive summary

This paper examines the process by which migrants experience gains in earnings subsequent to migration and, in particular, the advantage that migrants obtain from moving to large, dynamic metropolitan labour markets, using Toronto as a benchmark. There are two potentially distinct patterns to gains in earnings associated with migration. The first is a step upwards in which workers realize immediate gains in earnings subsequent to migration. The second is accelerated gains in earnings subsequent to migration. Immediate gains are associated with obtaining a position in a more productive firm and/or a better match between worker skills and abilities and job tasks. Accelerated gains in earnings are associated processes that take time, such as learning or job switching as workers and firms seek out better matches. Evaluated here is the expectation that the economies of large metropolitan areas provide workers with an initial productive advantage stemming from a one-time improvement in worker productivity and/or a dynamic that accelerates gains in earnings over time through the potentially entwined processes of learning and matching. This paper examines migration patterns of workers aged 20 to 29 and changes in income associated with moving. More precisely, it evaluates: (i) whether the rate of migration of young adults is higher to Toronto than to other parts of the country; (ii) whether these young migrants receive higher earnings than do migrants to other destinations and those not migrating; and (iii) whether the benefits are due to a one-time step upwards in earnings upon arrival and/or more rapid accumulation of income gains after moving.

Overall, the results suggest that Toronto benefits from a high in-migration of young workers (especially university graduates and knowledge workers). Moreover, and consistent with urban economic theory, moving to Toronto was associated with an earnings premium, such that in-migrants appear to receive an immediate step upwards in earnings, exceeding that associated with migration to other urban areas and/or not moving—a productivity and/or initial matching effect. However, contrary to the expectation of a more rapid career progression resulting from migrating to a large metropolitan economy, moving to Toronto did not accelerate the rate of earnings growth, that is; there is no evidence, on aggregate, of longer terms gains in earnings stemming from more rapid learning and effective matching facilitated by large labour markets.

1 Introduction

The research literature has established that earnings are significantly higher in large metropolitan areas than in other urban and rural locations (Glaeser and Maré 2001; Combes et al. 2008; Yankow 2006; Beckstead et al. 2010), a finding that holds across nations and over time. For example, in Canada, earnings in large metropolitan areas are more than 25% higher than in many rural locations (Beckstead et al. 2010).

Higher earnings in large cities reflect higher productivity resulting from more productive firms and/or the better matching between worker skills and job tasks, and the mix of skills and abilities (Combes et al. 2008; Yankow 2006; Beckstead et al. 2010). Education, especially postsecondary education, appears to account for a large portion of urban-rural wage differences, with large urban areas having a much higher share of degree-holders (Beckstead et al. 2010). This is attributable to the output of local educational institutions, internal migration of individuals with high levels of human capital, and immigration (Brown, Newbold and Beckstead 2010). The relative advantage of cities rests both on their capacity to educate and attract and retain highly skilled workers and on their ability to facilitate the productivity-enhancing interaction of workers and firms.

Fielding's (1992, 1997) concept of the escalator region is useful in evaluating the role of large metropolitan areas in relation to the labour market, occupational mobility, and migration. In this framework, young people are drawn to large metropolitan areas at the start of their working lives.[1] The variety and quality (higher level) of employment opportunities in these areas allow them to climb the career ladder relatively quickly. Escalator regions are thought to propel the socio-economic status of young migrants at a faster rate than do other regions (Fielding 1995).

The association between earnings growth and migration to an escalator region may be related to increased population density, which lends itself to greater productivity (Krugman 1991; Combes et al. 2008) and learning (Rauch 1993; Glaeser 1999; Glaeser and Maré 2001; Bacolod, Blum and Strange 2009). Gleaser and Maré (2001), for instance, find evidence that the gains in earnings of migrants to metropolitan areas take several years, which suggests that the gains stem, in part, from learning.

It has also been argued that larger labour markets have a greater demand for specialized skills (Kim 1989; Kim 1991) and provide better labour matching (Helsley and Strange1990; Kim 1989; Wheeler 2001; Andersson, Burgess and Lane 2007). Workers with specialized skills, such as university degree holders, have an incentive to move to larger urban centers, because of potentially greater wage gains from a better match between their skills and the tasks required by firms, and also because of lower search costs. This will be particularly important for households with more than one highly skilled worker (Costa and Kahn 2000).

Larger labour markets may also be specialized in high-order managerial and professional functions (Duranton and Puga 2005; Florida 2002a, b). As such, Canada's major metropolitan areas offer greater opportunity to gain the experience and contacts that permit young workers to rise through the corporate ranks, and thereby earn higher incomes. Of course, young, highly

1. This is consistent with the large flows into Canada's largest metropolitan centers observed by Brown, Newbold and Beckstead (2010).

skilled workers may be attracted to larger urban areas not only by potential gains in earnings. Larger urban areas may also provide consumption opportunities (Lee, 2010) and other amenities (Florida, 2002a,b).

Toronto, Canada's largest census metropolitan area (CMA), likely fulfills the role of a national escalator region. It has a highly diversified economy, with major financial (Drummond et al. 2002), high technology (Beckstead, et al. 2003) and manufacturing sectors (Brown and Baldwin 2003), and is a leading centre for head offices (Beckstead and Brown 2006). Toronto is the primary destination for immigrants to Canada (Schellenberg 2004), who constitute an important source of population and employment growth. While other metropolitan areas may have similar characteristics across one or two of these dimensions,[2] none is comparable across all of them.

The escalator hypothesis can be evaluated by examining young workers' migration patterns and the changes in income associated with migration to Toronto. This analysis focuses on people in their twenties because they are the most likely to migrate for employment reasons, and thereby, get on the escalator. The aim is to determine: (i) whether the rate of migration of 20- to 29-year-olds is higher to Toronto than to other parts of the country, and (ii) whether young migrants to Toronto receive higher gains in earnings than do migrants to other destinations and those who do not migrate. This paper measures the gross change in earnings following migration. It does not measure net gains, because this would depend on the origin of migrants (e.g., the distance between the origin and destination) potentially obscuring the effect of the destination on earnings gains, which is the focus of the study.

The remainder of this paper is organized as follows. Section 2 reviews the literature on migration, wages and escalator regions. Section 3 explains the data and methods used in the analyses. Section 4 presents the results, and Section 5, the conclusion.

2. For instance, Montreal is a highly diversified economy (Beckstead and Brown, 2003); Vancouver is also a major destination for immigrants (Schellenberg, 2004); and Calgary is an important and growing head office center (Beckstead and Brown, 2006).

2 Escalator regions, migrants, and earnings effects

While moving to large metropolitan areas may be triggered by job opportunities, are the benefits of migration long-lasting, for instance, in terms of career trajectory and/or income? In general, people with higher educational attainment receive greater economic rewards and experience greater occupational mobility as a result of migration, and are more likely to make long-distance moves (Newbold and Cicchino 2007; Newbold and Bell 2001; Stalker 2000). Moreover, migration research has demonstrated the link between geographic and occupational mobility (Fielding 1992; Dunford and Fielding 1997; Findlay et al. 2009; Van Ham 2001, 2002). This occurs not only through the independent movement of workers between regional labour markets, but also as a consequence of career mobility in the internal labour markets of transnational organizations with multiple sites (head office and branch locations) (Koser and Salt 1997). In fact, the literature associated with the productivity of cities predicts that migrants will receive immediate wage gains on moving to large metropolitan areas, regardless of ability (Glaeser and Maré 2001).

Gains in earnings associated with migration can be both immediate and gradual. Immediate gains may stem from obtaining a job in a more productive firm and/or a better match between worker skills and abilities and job tasks, both of which are associated with raising the worker's productivity. These gains are expected to be greater in larger metropolitan areas because firms are more productive and more specialized (see Kim 1989 and 1990). More productive firms are able to pay higher wages. More specialized firms demand a more specific set of skills on the part of workers that, in turn, implies workers are more likely to find a better match between their skills and job tasks.

Migrants may also experience wage gains stemming from processes that are more gradual. In large metropolitan areas, workers will tend to encounter more people from whom they can learn (Glaeser and Maré, 2001). Furthermore, because workers and firms are often not fully aware of each other's capabilities, the process of matching worker skills and abilities with job tasks is often imperfect. As a result, workers may have to engage in a series of matches before they find the right one. The thick labour markets that characterize large metropolitan areas are expected to accelerate this process, leading to more rapid wage gains over time.

Of course, the learning process may be tied to the rate at which workers switch between jobs. Switching between organizations offers workers the opportunity to learn from new people and, more broadly, new business cultures. Therefore, the process of learning and switching may be endogenous. As workers gain experience within an organization they may exhaust their learning opportunities and this prompts a move to a new organization—switching promotes learning and learning promotes switching. Recognizing the close association between learning and job switching, and to facilitate the discussion, more gradual gains from migration are termed a learning effect.

The mixed metaphor that emerges from this set of expectations regarding wages gains is that of a step and an escalator. Moving to a large metropolitan area may result in a discontinuous step up in wages, but it may also result in an increase in the rate of wage growth akin to stepping onto an escalator. It is this latter metaphor that links to Fielding's broader concept of the escalator region—his point being that some regions provide conditions that are well suited to

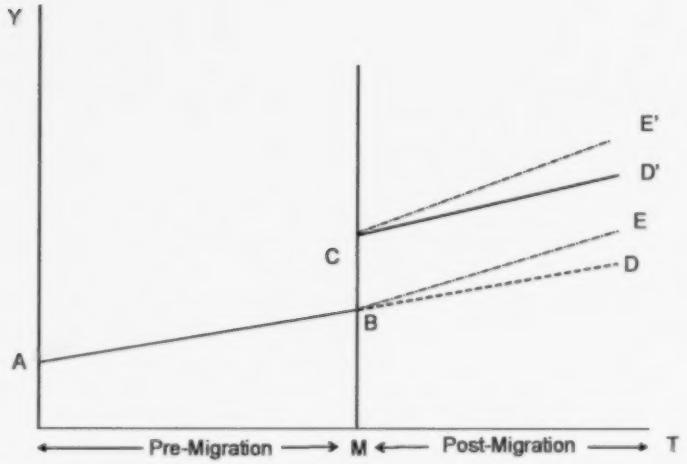
accelerating the career progress of workers and that this motivates workers to seek out these regions early in their career.

Figure 1 illustrates the potential income effects of migration to a large urban area: (i) no effect; (ii) an initial productivity effect only; (iii) learning effect only; and (iv) productivity and learning effects. First, migration may not result in a change in income level or the income growth rate (line A–D). That is, the slope of the income line does not change—there is no immediate post-migration increase. Second, the migrant may see an initial increases in productivity only, that leads to an income jump at the time of migration (line A–D'), but no change in the post-migration slope (growth rate) of income. The migrant's marginal revenue product increases, either because he or she is more productive, or because the price of what they produce is higher. Third, income may increase because of learning only (line A–E). In this case, there is no jump in income associated with migration itself, but the post-migration slope (growth rate) of income is steeper as the migrant gains skills more rapidly in the new location. Finally, income may increase as a result of both productivity and learning effects (line A–E').

Learning effects may be delayed by the age of the migrant or by duration of residence effects in the destination. That is, there may be a time lag between migration and wage growth, particularly in dual-earner households where one partner's earnings may decline as a result of disruptions in labour force participation and time in employment (Cooke and Speirs 2005; Cooke et al. 2009). For instance, Cooke et al. (2009) found that the earnings of women, who are often "tied" migrants, fall at migration and then slowly recover. Temporal effects associated with the impact of migration on earnings for tied migrants have also been noted (Spitze 1984). Clark and Withers (2002) reported that migration reduced employment among married women by more than 20%, with recovery to pre-migration levels taking about a year. As well, job-specific skills may not be transferable to the new location (Bonney and Love 1991), so tied migrants may be underemployed (Markham, 1986).

Workers in Toronto, Canada's largest metropolitan area, already command high incomes. (In this study, unless otherwise specified, "income" refers to "earned income.") In 2005, Toronto's median household income was $64,128, approximately $3,000 more than the provincial median, and about $10,400 more than the Canadian median. The difference was even more pronounced relative to the urban-rural hierarchy, with incomes decreasing at successively lower levels, and the lowest generally in rural areas (Beckstead et al. 2010).

Figure 1
Theorized pre- and post-migration income effects



Note: The figure illustrates four theoretical relationships between income (Y) and migration, which occurs at a discrete point (M) on the time-line (T). Line A-D indicates no change in income at the time of migration or income growth post-migration. Line A-D' indicates an increase in income at the time of migration, but no change in the rate of income growth post-migration. Line A-E indicates no increase in income at the time of migration, but greater income growth post-migration. Line A-E' indicates both income increases at the time of migration and greater income growth post-migration.

By assessing the impact of migration to Toronto on the income of workers aged 20 to 29, this analysis addresses following question: At the end of the post-move period, are the differences in income among the migrants to Toronto, migrants to other areas, and non-migrants due to an immediate jump in income or to a steeper post-move growth rate?

3 Data and methods

Three complementary Statistics Canada data sources are used to evaluate the escalator hypothesis: (i) the master (20% "long-form") files of the 2001 and 2006 Canadian Censuses of Population; (ii) the 1993, 1996 and 1999 panels of the Survey of Labour Income and Dynamics (SLID), and (iii) the Longitudinal Administrative Databank (LAD) covering the 1982 to 2006 period. The census file is a large, nationally representative database that provides a "snapshot" of the population on census day. SLID is a longitudinal survey, with each panel collecting labour market and income information over a six-year period and consisting of approximately 30,000 households each. In addition to labour market activity and income information, SLID collects information on household location and socioeconomic and demographic characteristics. The SLID files make it possible to track changes in location and income, and thereby compare the income of migrants and stayers, while controlling for fixed effects. The LAD files covered nearly 5 million tax-filers in 2006, representing a 20% longitudinal sample of all tax-filers and their families. Mobility histories that include demographic data can be compiled and linked to income data in order to construct detailed, longer-term histories of migrants and stayers. Tax-filers who are selected remain in the sample even if they do not file tax returns in subsequent years. Income values derived from the LAD are adjusted for inflation, using 2006 as the base year.

These three databases complement each other in several ways. Because of its size and scope, the Census provides a detailed picture of the migratory patterns across age classes, while also offering a detailed socio-economic profile of migrants and stayers. Neither the SLID, because of its relatively small sample, nor the LAD, because of its limited set of variables, provide such an accurate and detailed picture. However, unlike the LAD and SLID, the Census is limited because it is not a panel. Therefore, it cannot measure directly pre- and post-migration income nor can panel-based econometric techniques be applied to it. Because the SLID includes such detailed information on migrants and stayers, it provides a means to take into account a large number of factors that may confound the effect of migration on incomes within a panel setting. However, because of its small sample size, it is not possible to use the SLID to distinguish between the immediate and more gradual effects of migration on earnings. Due to its large sample size, the LAD offers a means to accurately estimate the immediate step upwards in earnings post migration and any subsequent acceleration in earnings growth.

People who moved either in the five-year interval defined by the census or between years in the SLID and LAD data are classified as those who migrated into (out of): the Toronto CMA; other large, medium, or small urban areas; and rural areas. "Other large" urban areas are CMAs with populations greater than 500,000 (Montreal, Vancouver, Ottawa, Winnipeg, Quebec City, Calgary, and Edmonton). "Medium" urban areas are CMAs with populations between 100,000 and 499,999. "Small" urban areas are census agglomerations (CAs) with populations greater than 10,000. "Rural" is defined as non-CMA/CA census subdivisions. People who did not move—stayers—are those who stayed in (i) Toronto or (ii) elsewhere in Canada during the specified period.

Census files are used three ways. First, net migration rates for the Toronto CMA are calculated, using the 2001 and 2006 census files. Rates are calculated for all ages (age 5 or older),

knowledge workers[3] (individuals in professional, management or technical occupations), and degree-holders (bachelor's degree or higher). These data make it possible to determine if there is selective (i.e., by age, knowledge worker) migration to/from Toronto that suggests an escalator region. Younger workers are attracted to escalator regions because the net present value of expected gains in earnings from migration to these regions is higher than older workers. More highly educated workers are attracted because these regions are expected to offer a better match between these workers more specialized skills and job tasks, which would result in higher earnings, presuming a competitive labour market.

Second, the mean earned income of migrants and stayers is calculated based on the 2006 Census. The sample is restricted to non-institutionalized individuals aged 20 to 29[4] (at the end of the census interval) who reported earning an income in 2005. Consistent with Statistics Canada guidelines, all reported values are weighted and rounded.

Third, multiple regression (OLS) is used to evaluate the correlates of income (log earned income, based on the 2006 census) and assess the income advantage associated with migration, defined by:

$$\log(W_k) = X_k\beta + U_k\Gamma + \varepsilon_k, \quad (1)$$

where W_k is the log of earned income for individual k; X_k is a vector of individual characteristics (degree-holder status, age, gender, knowledge worker status, employment status (self-employed/employed), visible minority status, and full-/part-time status); and U_k is a set of dummy variables capturing the range of migrant and stayer statuses. Equivalent models are estimated for those migrating into (out of) Toronto, contrasted with those who stayed in Toronto over the interval.

The SLID sample also pertains to employed 20- to 29-year-olds who reported an income. With the SLID, however, migrants include anyone who moved between years t and $t + 1$ in any of the panels, whereas the census captures movement over the five years before census day. To attain sufficient sample size, the three SLID panels were merged to form one "panel." The dates were recoded to reflect the information for each year of the panel. That is, the data for the first year (1993,1996,1999) were recoded as Year 1 and so on to Year 6 (1998,2001,2004). Individuals who are institutionalized at any time over the course of the panel were excluded from the sample, as were residents of the three northern territories.

The SLID files are used two ways. First, the mean difference in (i) after-tax income between the beginning and end panels and (ii) average pre- and post-migration after-tax income are calculated for migrants and stayers. Second, following Glaeser and Maré (2001), a fixed-effects model is used to estimate the difference in the log of after-tax income of migrants and stayers, removing individual, time-invariant omitted ability bias, defined as:

$$\log(\Delta W_k) = \Delta X_k\beta + U_k\Gamma + \lambda + \varepsilon_k, \quad (2)$$

where ΔW_k is the difference in the log of after-tax income between panel 1 and panel 6 for individual k; λ is a dummy variable corresponding to the SLID panel (1, 2 or 3); and Γ is a set of dummy variables capturing the range of migrant and stayer statuses.

Analyses based on the LAD files evaluate the mean difference in individual employment income: (i) one year pre- and post-migration; (ii) five-year average pre- and post-migration; and (iii) five-year post-migration income growth rate. Focusing on the change in income asks whether migration is associated with a discontinuous change in income immediately post

3. See Beckstead and Vinodrai (2003) for a discussion of the definition of knowledge workers used here.
4. Individuals that were students during the study period were excluded from the Census, SLID and LAD.

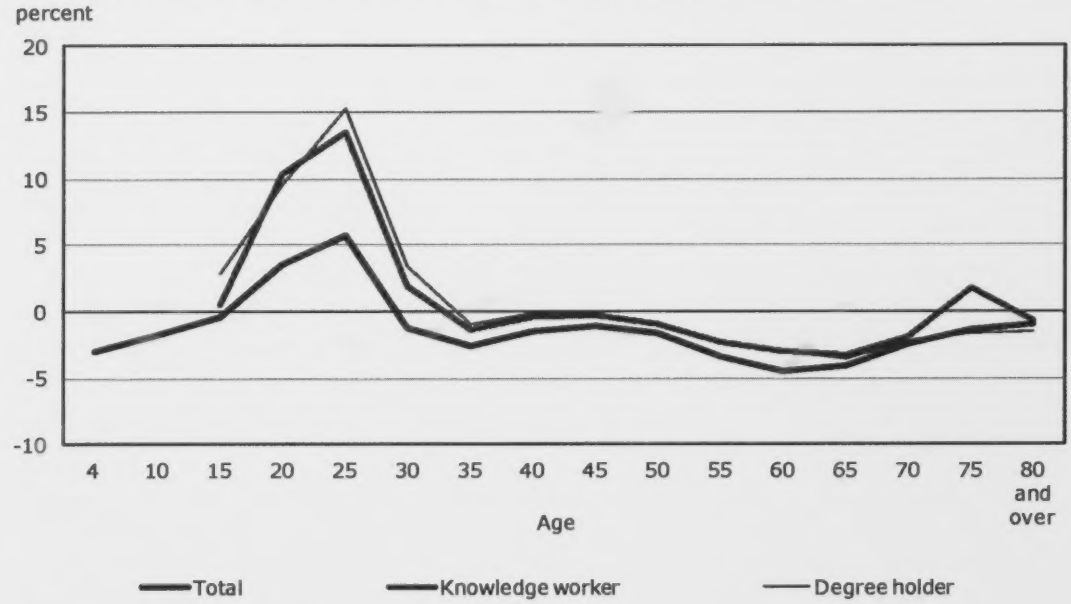
migration, and thereby evaluates the potential for productivity effects associated migration defined above. The post-migration rate of income growth evaluates learning effects—did moving to Toronto result in increased learning (rewarded by faster income growth), compared with moving somewhere else or not moving?

One of the key methodological issues is accounting for selection. That is, discriminating between the productivity/learning effects associated with migrating to Toronto and the income gains that would have occurred without migration. If workers with superior skills and abilities are more likely to move to Toronto, these characteristics will confound estimates of the role of Toronto as an escalator region. Indeed, such workers are likely to have the most to gain from migrating to an escalator region, as they are the ones who would expect to best take advantage of the career progression offered by this type of region. Hence, after providing some initial descriptive statistics and estimates of the association between migration and earnings, the analysis pays particular attention to the confounding effect of selection (Section 4.2).

4 Results

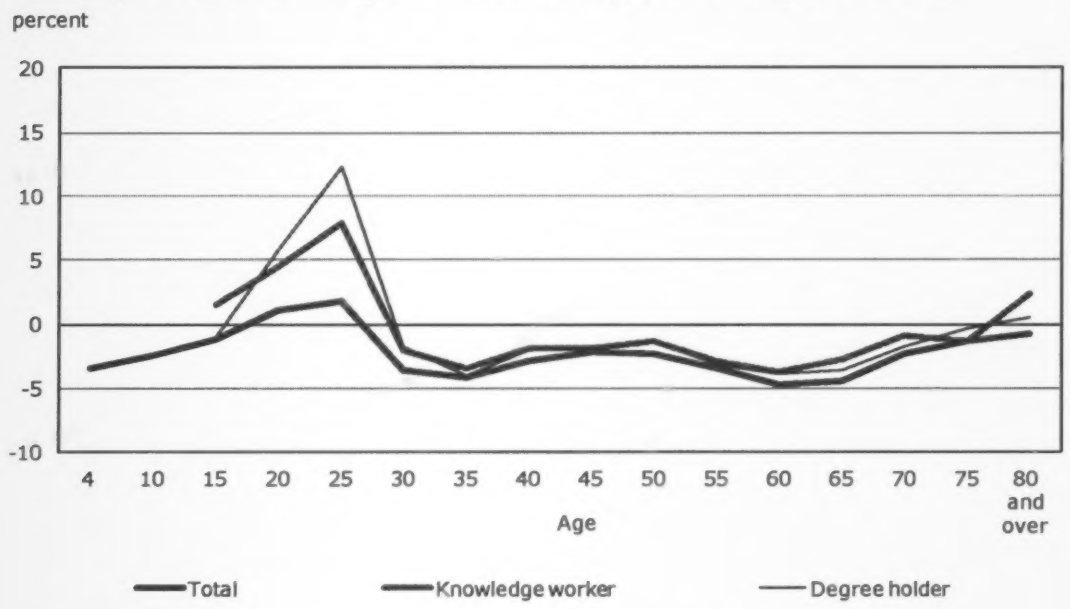
Net migration rates for the Toronto CMA, by age, knowledge worker status and degree-holder status, are shown in Chart 1 (1996 to 2001) and Chart 2 (2001 to 2006). Both clearly illustrate net in-migration of young adults. The attraction that Toronto holds for the young was magnified among knowledge workers and degree-holders, with net migration rates among 25- to 29-year-olds with these characteristics three to four times higher than those of the overall population.

Chart 1
Net migration rates for the Toronto Census Metropolitan Area, by age, total population, knowledge workers and degree-holders, 1996 to 2001



Source: Statistics Canada, Census of Population (2001).

Chart 2
Net migration rates for the Toronto Census Metropolitan Area, by age, total population, knowledge workers and degree-holders, 2001 to 2006



Source: Statistics Canada, Census of Population (2006).

Patterns in net migration rates by age, education, and knowledge worker status suggest that Toronto is an escalator region. Net migration by age group supports the broad cycling of individuals into Toronto during their prime years for labour force entry, particularly the better-educated and knowledge workers who are more likely to experience income gains. However, migration rates themselves reveal nothing about the earnings benefits of moving. For this, it is necessary to analyze the income data in the census, SLID and LAD files (Table 1).

The census analysis examines income based on self-reported 2005 earnings, by migrant status. The average income of 20- to 29-year-olds who moved to Toronto between 2001 and 2006 was $29,486, an amount exceeding that of migrants to other destinations and stayers in that age range. Even so, almost all migrants—whether to other urban areas or to rural areas—earned more than did stayers. For instance, migrants to other large urban areas, small urban areas and rural areas all averaged at least $25,000, which was higher than what young adults who stayed in Toronto reported ($23,406). Those who stayed in other areas earned an average of $21,889.

Values reported for the SLID show the mean difference in (i) after-tax income between the beginning and end panels by migrant status, and (ii) average pre- and post-migration after-tax income. The differences in after-tax income between the beginning and end panels reveal a clear gradient, with 20- to 29-year-olds migrants to Toronto experiencing the largest increase ($18,469), an amount that substantially exceeded the increase for those who stayed in Toronto over the period ($13,818). The incomes of migrants to other urban areas also rose, but not as much. For instance, those who moved to other large urban areas saw their earnings rise by $12,692, and migrants to small urban areas saw an increase of $12,991. The smallest increase was among those who moved to rural areas ($9,752). When average pre- and post-migration income is considered, again, a clear advantage emerged for migrants to Toronto, with a difference of $12,207. By contrast, the difference between average pre- and post-migration incomes among migrants to rural areas was only $5,511.

Results based on the LAD file are similar. Again, 20- to 29-year-old migrants to Toronto reported the largest income difference. For instance, when incomes one year pre- and post-migration are compared, the difference for Toronto-bound migrants was $15,300. Migrants to other large urban areas experienced an increase of $7,100 in the same period, and for people who stayed in Toronto, the gain was $4,200. Differences in pre- and post-migration incomes generally narrowed at successively lower levels of the urban-rural hierarchy. Migrants to rural areas reported the smallest difference ($3,000).

The results are similar when the average income change five years pre- and post-migration is examined, with migrants to Toronto reporting the largest difference ($29,000). Migrants to other large urban areas gained more ($15,800) than did young adults who stayed in Toronto ($12,700). For migrants to rural areas, the increase was $11,000.

A different picture emerges when the average five-year growth rate of income after migration is calculated. Moving to Toronto does not appear to convey an advantage relative to staying in Toronto, with both groups of 20- to 29-year-olds experiencing the same rate of income growth (1.7%) over the five years. The incomes of migrants to other large urban rose somewhat faster (1.9%), but the fastest income growth—3.3%—was among migrants to small urban areas. Migrants to rural areas had the smallest income growth rate (0.6%) during the period.

Overall, the descriptive results generally support the escalator hypothesis, at least in terms of (i) young adult migrants, and (ii) the absolute difference in pre- and post-migration earnings. Migrants to Toronto appear to earn more and to experience a larger increase in income, compared with other migrants or with people who did not move. However, given that post-migration income *growth rates* for migrants to Toronto were similar to those of people who stayed in Toronto, the increase associated with moving to that CMA is more consistent with productivity effects (line A–D') than with learning effects (lines A-E or A-E').

The remainder of this paper attempts to disentangle these findings from the influences of omitted variable and selection bias.

Table 1
Total earned income (2005) and change in income, by migrant status, population aged 20 to 29

Migrant status	2006 Census	Survey of Labour and Income Dynamics (SLID)		Longitudinal Administrative Databank (LAD)		
	Earned income (2005)	Change in total after-tax income [1]	Change in average after-tax income [2]	Change in income (1 year)	Change in income (5 year average)	Annualized 5 year growth rate
		dollars				percent
Migrated into Toronto	29,486	18,469	12,207	15,300	29,000	1.7
Stayed in Toronto	23,406	13,818	8,420	4,200	12,700	1.7
Migrated into large urban area	25,061	12,692	7,994	7,100	15,800	1.9
Migrated into medium urban area	22,844	12,977	8,163	5,000	12,500	1.4
Migrated into small urban area	25,829	12,991	7,721	5,200	12,600	3.3
Others stayed elsewhere	21,889	10,903	6,456	3,600	10,600	2.1
Migrated into rural area	25,758	9,752	5,511	3,000	11,000	0.6

1. Change in after- tax income between panels 1 and 6 of SLID.
2. Change in average pre- and post- migration income.
Note: Values normalized to 2006 and based on individual total income.
Source: Statistics Canada, Census of Population (2006); Survey of Labour and Income Dynamics; and Longitudinal Administrative Databank.

4.1 Multivariate results

While largely consistent with the escalator hypothesis, differences in earnings by migrant status may be associated with the intertwined effects of unobserved abilities and skills, and with selection. Earnings gains associated with migration may reflect more the harvesting of workers with superior skills and abilities than any role that the CMA plays as an escalator region. To account for these possibilities, a multivariate analysis of income level and income growth, using the 2006 Census and SLID files, is conducted. Later, the issue of selection bias is pursued through propensity score matching models.

Based on census data (Model 1, Table 2) and relative to "other stayers" (the reference category), the income premium (increase in earnings) for 20- to 29-year-olds who moved to Toronto in the 2001 to 2006 period was 10.4%, essentially the same as that of their contemporaries who stayed in Toronto (9.9%). However, those who moved elsewhere received much lower income premiums. Other correlates of earned income behaved largely as expected, with higher premiums associated with older age, knowledge workers, wage-earners, self-employment, full-time employment, and males. Visible minority status was associated with lower premiums, as was degree-holding. The latter, however, may be related to the fact that the effect of knowledge worker status on incomes is taken into account and, because of delayed labour force entry, degree holders would tend to have less work experience relative to other workers in their young cohort.

Model 2 repeats the analysis, but compares migrants to Toronto only with their contemporaries who stayed in Toronto. Similar to Model 1, migration to Toronto was associated with an income advantage, with in-migrants' premium exceeding that of stayers by 4.1%.

Models 3 and 4, two first-difference models, evaluate the effect of migration on the change in income over time based on the SLID. Differencing the data addresses the influence of fixed, unobserved characteristics of migrants and non-migrants (for example, abilities) that might be

biasing the estimates of the Toronto wage premium derived from the census data. Models 3 and 4 both incorporate: changes in a set of migrant characteristics thought to influence income growth (for example, degree-holder status); initial income levels to take regression to the mean into account; a set of migrant status variables; and controls for the panels, which can be thought of as a set of binary variables accounting for different periods.

Table 2
Income premiums, by migrant status and selected characteristics, population aged 20 to 29

	2006 Census				Survey of Labour and Income Dynamics			
	2005 Earned income				Change in total after-tax income between panels 1 and 6			
	Model 1[1]		Model 2[2]		Model 3[1]		Model 4[2]	
	coefficient	p-value	coefficient	p-value	coefficient	p-value	coefficient	p-value
Constant	3.6420	0.0001	4.0000	0.0001	8.1220	0.0001	7.9400	0.0001
Migrant status								
Migrated to Toronto	0.1040 *	0.0001	0.0410 *	0.0001	0.2690 *	0.0001	0.0900	0.2591
Migrated to large urbanarea	0.0560 *	0.0001	...	...	0.0770 *	0.0019	...	...
Migrated to medium urban area	-0.2840 *	0.0001	...	...	0.0500	0.1177	...	...
Migrated to small urban area	0.0450 *	0.0001	...	...	0.0680	0.0821	...	...
Migrated to rural area	-0.0050 *	0.3951	...	...	-0.0070	0.9336	...	...
Stayed in Toronto	0.0990 *	0.0001	...	...	0.1430 *	0.0001	...	...
Age	0.3110 *	0.0001	0.2890 *	0.0001	...	...	...	...
Age-squared	-0.0040 *	0.0001	-0.0040 *	0.0001	...	...	...	...
Male	0.2010 *	0.0001	0.1830 *	0.0001	...	...	...	...
Immigrant	0.0630 *	0.0001	-0.0610 *	0.0002	...	...	...	...
Knowledge worker	0.2580 *	0.0001	0.2260 *	0.0001	...	...	...	...
Degree-holder	-0.0310 *	0.0001	-0.0590 *	0.0011	...	...	...	...
Employed full time	0.7840 *	0.0001	0.8650 *	0.0001	...	...	...	...
Wage earner	0.4350 *	0.0001	0.2110	0.0512	...	...	...	...
Self-employed	0.0820 *	0.0003	-0.0860	0.4375	...	...	...	...
Visible minority	-0.2610 *	0.0001	-0.1340 *	0.0001	...	...	...	...
Log (after-tax income, year 1)	...	...	...	...	-0.8120 *	0.0001	-0.7700 *	0.0001
Years of schooling	...	...	...	...	0.0840 *	0.0001	0.1050 *	0.0001
New degree-holder	...	...	...	...	0.2520 *	0.0001	0.3740 *	0.0001
New knowledge worker	...	...	...	...	0.0850 *	0.0001	0.1930 *	0.0191
Panel 2	...	...	...	...	0.1310 *	0.0001	0.1790	0.0580
Panel 3	...	...	...	...	0.1200 *	0.0001	-0.0630	0.5070
Diagnostic statistics								
Number of observations	636,153	...	49,430	...	5,551	...	312	...
F-statistic	15,311.4000	0.0001	1,814.8000	0.0001	821.9800	0.0001	59.9800	0.0001
Adjusted R-squared	0.2780	...	0.2880	...	0.6090	...	0.5700	...

* significant at p<0.05; p-values 0.001 are equal to 0.001 or less.
1. Compared with people aged 20 to 29 who did not live in Toronto and who did not move.
2. Compared with people aged 20 to 29 who stayed in Toronto.
Source: Statistics Canada, Census of Population (2006) and Survey of Labour and Income Dynamics.

Consistent with the census results, according to the SLID, the income premium for 20- to 29-year-olds who moved to Toronto exceeded that of all other migrants (Model 3). Paralleling the census-based models, Model 4 contrasted migrants to Toronto with young adults who stayed in Toronto over the panel. In this case, the income premium for migrants to Toronto, while positive, was not statistically significant. This is not entirely surprising, given the smaller sample size and the less efficient first-difference estimator. However, individuals who received a bachelor's

degree over the panel (degree change) and new knowledge workers earned a larger income premium, regardless of migrant status. Likewise, increased number of years in school was associated with higher income premiums. As expected, the coefficient on initial income levels is negative and significant.

4.2 Accounting for selection

A problem in estimating the returns to migration is that migrants may be self-selective; that is, their earnings gains may not be due to productivity and/or learning effects, but rather to workers with superior skills and abilities being more likely to migrate. An escalator region is hypothesized to offer conditions that favour gains in earnings, so presumably, workers with the skills and abilities to take advantage of those conditions would chose to migrate. Consequently, the estimated effect of migration can be exaggerated if migrants have attributes that make them more mobile, and ultimately more productive in alternate locations.

To deal with this problem, propensity score matching is used to control for migrant selectivity,[5] while estimating the effect of migration to Toronto on earnings growth. For this calculation, D = 1 if an individual migrates, and D = 0 otherwise, with the income results defined as Y1 and Y0. The aim is to estimate the average treatment effect on the "treated" (ATT) (that is, people who migrate to Toronto):

$$ATT = E(Y_1 - Y_0 \mid D=1) = E(Y_1 \mid D=1) - E(Y_0 \mid D=1) \quad (3)$$

The first term on the right hand side is observed, but the earnings gain that migrants would have experienced had they not migrated (E(Y0 | D = 1)) is not, and therefore, is estimated with propensity score matching (Rosenbuam and Rubin 1983). Stata is used to implement the psmatch2 routine (Leuven and Sianesi 2003). Both the SLID and LAD databases have information on income (and other attributes) before and after migration.

Propensity score matching assumes unconfoundedness: $Y_0 \perp D \mid X$, where X is a vector of variables (usually containing pre-treatment variables and time-invariant individual characteristics) unaffected by the treatment, and $\perp$ indicates independence. That is, conditional on a set of observables X, earnings growth for those who do not move is independent of actual treatment status. This, of course, depends on the unobservable variables having no influence on being in either the treated or non-treated group (migrants and stayers). Consequently, it is necessary to develop a set of observables associated with the propensity to migrate.

The choice of conditioning variables associated with the propensity to migrate was based on the migration literature. The matching procedure balances the covariates between migrants and stayers to make the distribution of the counterfactual outcome of migration the same as for the group of stayers. The LAD provides demographic characteristics (for example, age, family status), income, and origin of the migrant/stayer. The SLID provides a similar set of conditioning variables, and also education (less than high school, high school graduate, and degree-holder), knowledge worker status (employed in science, education, or other "creative" occupations), and geographic origin (Table 3). In addition, the SLID data allow the derivation of variables indicating whether an individual received a degree or became a new knowledge worker over the period.

5. For a complete discussion of propensity score matching, see Ham et al. (2004), Moilanen (2010), and Rosenbaum and Rubin (1983).

Table 3
Variables used for conditioning effects

Survey of Labour and Income Dynamics (SLID)		Longitudinal Administrative Databank (LAD)	
Gender (reference group equals female)	Male	Gender (reference group equals female)	Male
Marital status (reference equals non-married)	Married	...	...
Not applicable (...)	...	Family type (reference group equals other)	Couple with no children
Not applicable (...)	...	...	Couple with children
Not applicable (...)	...	...	Single parent
Age (reference group equals aged 20 to 29)	Aged 20 to 24	Age (reference group equals age 20)	Age by individual year
Nativity (reference group equals non-immigrant)	Immigrant	Nativity (reference group equals non-immigrant)	Immigrant
Language (reference group equals all other languages)	French	Language (reference group equals all other languages)	French
Education (reference group equals less than high school graduation)	High school graduate	...	...
Not applicable (...)	Bachelor's or more	...	...
Not applicable (...)	New degree-holder (obtained degree over panels)	...	...
Occupation	Knowledge worker	...	...
Not applicable (...)	New knowledge worker (transitioned over panels)	...	...
Starting income	After-tax income at start of panel	Starting income	Income before migration
Visible minority (reference group equals non-visible minority)	Visible minority	Visible minority (reference group equals non-visible minority)	Visible minority
Panel (reference group equals panel 1)	Dummy variable for panels 2 and 3	...	...
Origin (reference group equals rest of Ontario)	Atlantic provinces	Origin	Montreal
Not applicable (...)	Quebec	...	Ottawa-Gatineau
Not applicable (...)	Prairies	...	Calgary
Not applicable (...)	British Columbia	...	Edmonton
Not applicable (...)	...	...	Vancouver
Not applicable (...)	...	...	Other large Census Metropolitan Area
Not applicable (...)	...	...	Medium Census Metropolitan Area
Not applicable (...)	...	...	Other Census Agglomerations

"New knowledge worker" and "new degree-holder" are potentially important conditioning variables, but they may be problematic. Changes in occupation and education may represent important differences between the "treated" (migrants) and "untreated" (non-migrants), particularly among young workers. However, the decision to obtain a degree or change occupation may be affected by the decision to migrate. It is not unreasonable to expect that moving to Toronto would lead a migrant to change occupations and/or to obtain a degree. If so, the unconfoundedness assumption would be violated. This issue will be discussed later in the paper.

The SLID and LAD are complementary, each offering advantages and disadvantages. The LAD provides more information about the trajectory of migrant incomes over time. It can distinguish income gains associated with productivity from those associated with learning, whereas the SLID can capture only the combined effect of learning and productivity on income. However, because the LAD has fewer conditioning variables, confidence that the unconfoundedness assumption holds is reduced. Therefore, it is worthwhile to pursue propensity score matching using both datasets.

A logit model is used to calculate the propensity score, $\hat{P}(X)$, for each migrant and stayer, and bootstrapping is used to obtain standard errors for the matching estimators. Kernel matching—a non-parametric matching estimator that uses weighted averages of individuals in the control group—is used to construct the counterfactual outcome of a "treated" individual. The advantage of kernel matching is that with more than one individual as a counterfactual, the variance is reduced as more information is used. When comparison group observations are distributed asymmetrically around the treated observation, or when there are gaps in the propensity score distribution, a kernel-based procedure is beneficial because it only uses the additional observations where they actually exist. In most cases, the conditioning variables are well balanced, and matching does a good job with pre-migration variables such as gender, immigrant status, age and education.[6]

Table 4 reports the results of the logistic analysis of the likelihood of migration based on the SLID. Sample sizes differs between the four models based on the comparator group and income measure used, with Models 1 and 2 contrasting migrants to Toronto with other system migrants, and Models 3 and 4 contrasting migrants to Toronto with non-Toronto stayers. The models are further distinguished by the income measure used, with Models 1 and 3 using the average pre- and post-migration income, and models 2 and 4 comparing the difference in start and end income

Although the statistical significance of the results varies across the four models, they have the expected signs in each model, and are generally consistent across all four models. For instance, young adults who were married, were French-speakers, and were aged 20 to 24 were *less* likely to migrate Toronto, whereas new knowledge workers (became a knowledge worker over the panel) were *more* likely to do so. Immigrants were more likely to migrate to Toronto (Models 1 and 2 only). Visible minority status was associated with increased likelihood of migration to Toronto only in Model 2. Being a high school graduate was associated with an increased likelihood of migration to Toronto (Models 3 and 4), as was being a degree-holder (except in Model 1). Migrants originating outside Ontario were also less likely to migrate to Toronto, compared with those from other parts of Ontario. Gender was not statistically significant in any model.

6. Balancing test tables are available from the authors on request.

Table 4
Coefficients relating selected characteristics in the Survey of Labour and Income Dynamics to propensity to migrate to Toronto based on samples used to construct models assessing effect of migration on income, population aged 20 to 29

Characteristics	Model 1		Model 2		Model 3		Model 4	
	coefficient	p-value	coefficient	p-value	coefficient	p-value	coefficient	p-value
Constant	-0.771	0.034	-1.794	0.001	-3.057	0.001	-2.768	0.001
Male	-0.126	0.550	-0.153	0.365	-0.004	0.980	-0.117	0.473
Married	-0.446 *	0.047	-0.747 *	0.001	-0.253	0.216	-0.386 *	0.037
French	-1.418 *	0.001	-0.938 *	0.011	-0.704	0.077	-0.536	0.133
Immigrant	0.863	0.074	0.777 *	0.037	0.184	0.635	0.219	0.525
Visible minority	0.310	0.492	0.793 *	0.025	0.110	0.768	0.308	0.348
Aged 20 to 24	-0.687 *	0.005	-0.457 *	0.022	-0.445 *	0.039	-0.477 *	0.016
High school graduate	0.125	0.591	0.185	0.330	0.444 *	0.029	0.453 *	0.014
Degree-holder	0.473	0.224	0.599 *	0.050	1.525 *	0.001	1.608 *	0.001
New degree-holder	-0.089	0.727	0.072	0.734	0.729 *	0.001	0.627 *	0.002
Knowledge worker	0.232	0.406	0.174	0.442	0.685 *	0.004	0.529 *	0.016
New knowledge worker	0.701 *	0.004	0.625 *	0.001	0.933 *	0.001	0.809 *	0.001
Earnings (panel 1)	0.001	0.381	0.001	0.376	0.001	0.241	0.001	0.303
Panel 2	0.489 *	0.037	0.239	0.208	0.227	0.259	0.102	0.578
Panel 3	0.558 *	0.033	0.233	0.261	0.015	0.945	-0.078	0.693
Atlantic	-1.020 *	0.001	-1.083 *	0.001	-1.054 *	0.001	-0.850 *	0.001
Quebec	-1.890 *	0.001	-1.452 *	0.001	-1.464 *	0.001	-1.763 *	0.001
Prairies	-3.431 *	0.001	-2.608 *	0.001	-2.386 *	0.001	-2.282 *	0.001
British Columbia	-2.288 *	0.001	-1.560 *	0.001	-1.422 *	0.001	-1.540 *	0.001

	Model 1		Model 2		Model 3		Model 4	
Diagnostic statistics								
Number of observations	1,184	...	2,801	...	4,837	...	5,340	...
Likelihood ratio	242.220	...	220.940	...	200.880	...	237.390	...
Pseudo r-squared	0.267	...	0.162	...	0.149	...	0.148	...

* significant at p<0.05; p-values 0.001 are equal to 0.001 or less.

Note: Because the sample sizes on which the models were based differed, small variations emerged between models in the characteristics significantly related to migrating to Toronto.

Source: Statistics Canada, Survey of Labour and Income Dynamics.

Table 5 reports the propensity score matching estimates of earnings premiums associated with migrating to Toronto, based on the SLID data.[7] Migrants to Toronto are contrasted with people who moved elsewhere and with non-migrants who did not live in Toronto. The comparisons are based on average pre- and post-migration income and the difference in pre- and post-migration income between the start (year 1) and end (year 6) of the panel.

In each model, Toronto migrants' wage gains (average treatment effect of the treated or ATT of migrating) were significantly higher than those of migrants to other places, and those of non-Toronto residents who did not move. On average, Toronto-bound 20- to 29-year-olds earned an additional $4,100, compared with those who moved elsewhere. As well, the relative wage gains of migrants to Toronto persisted based on a comparison of their pre- and post-migration incomes with those of other migrants or stayers (about $4,300) and when their end and start incomes were compared (about $5,000). These amounts were substantial: compared with other migrants, those who went to Toronto increased their incomes by an additional $4,100 ($12,079 versus $7,946) (data not shown).

Also of interest is the difference between the ATT and the unmatched income differences. In all cases the ATT is lower. Therefore, part of the income effect of migration can be attributed to the

7. Values reported are based on nominal dollar values. Semi-log versions (logged income difference) based on the standard Mincer (1974) formulation were also estimated, with results available from the authors. Although coefficients and *p* values changed from those reported in this table, the relationships remained the same.

correlation of the decision to move with other characteristics of the migrants that influence income gains. Whether all the selection bias has been accounted for is open to question, so it is not possible to attribute all the remaining income gains to productivity and learning effects. Nonetheless, the patterns give the results credibility.

In particular, the selection effect is greater when the income gains of migrants to Toronto are compared with those of stayers rather than with those of other migrants (Table 5). This is an intuitive result—migrants to Toronto would be expected to have more in common with other migrants than with people who did not move. Moreover, after matching, the gains from migration were the almost same regardless of the comparison group (other migrants or stayers). These are findings that would be expected if the model was effectively controlling for selection.

Because inclusion of "new knowledge workers" and "new degree-holders" may violate the unconfoundedness assumption, a set of models excluding them was estimated (restricted model in Table 5). Their exclusion increases the value of the ATT, particularly when stayers are used as a control group. As a result, the intuitive results of the full model no longer hold, because the ATTs across comparison groups now differ markedly. The full model, therefore, is preferred because it provides more conservative estimates of the ATT. However, this preference is tempered by the problematic nature of the "new knowledge worker" and "new degree-holder" variables. Consequently, emphasis should be on the gains from migration to Toronto as measured by the difference between average pre- and post-migration income, compared with other migrants. It is here that selection appears to have the weakest influence on the results, and the results are the least sensitive to the model chosen.

Table 5
Propensity score matching estimates of effect of migration to Toronto on earned income relative to other migrants and non-migrants, population aged 20 to 29

Model	Comparison group	Income premiums		
		Unmatched	Average treatment effect on treated[1]	
			Full model	Restricted model [2]
			dollars	
Post-migration minus pre-migration income	Other migrants	4,596	4,134	4,597
End minus start income (year 6 minus year 1)	Other migrants	6,051	4,968	5,547
Post-migration minus pre-migration income	Stayers	6,227	4,269	5,471
End minus start income (year 6 minus year 1)	Stayers	8,292	5,039	7,355

1. Effect of migration on income of migrants.
2. Excludes new knowledge worker and new degree holder.

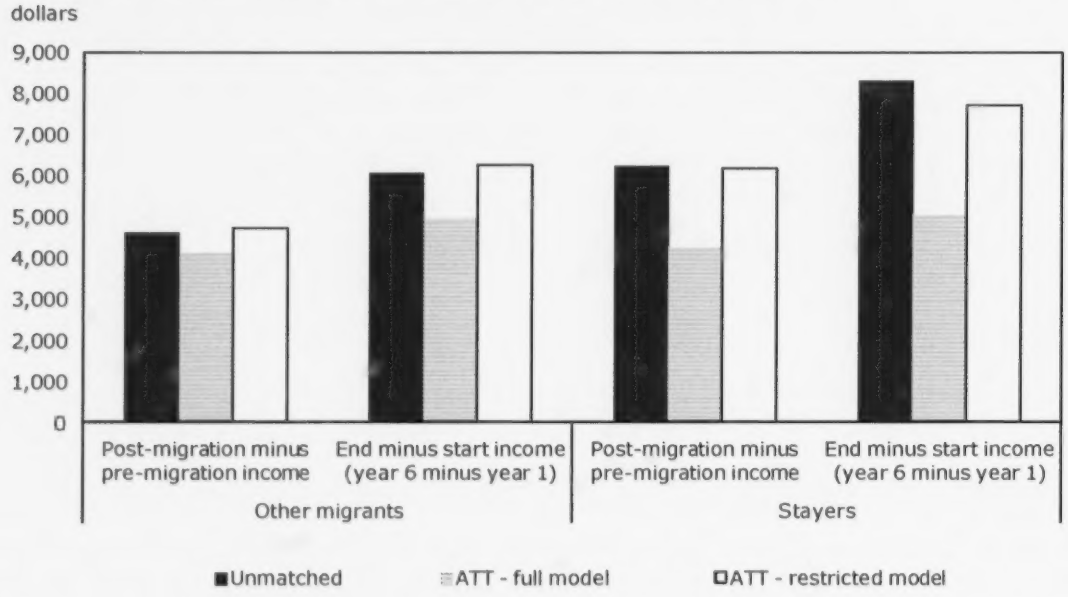
Note: For all models, average treatment effect on the treated is significant at $p<0.05$.
Source: Statistics Canada, Survey of Labour and Income Dynamics.

The sensitivity of the SLID-based ATT estimates to the model specification raises the question of whether the more restricted set of conditioning variables provided by the LAD would be sufficient. Therefore, before presenting the LAD results, the SLID-based ATT was re-estimated using propensity score matches based on a set of variables that closely resembles those available from the LAD. Chart 3 presents the relative income gains from migrating to Toronto for unmatched and matched observations, using the full model and the more restrictive model with variables similar to those available from the LAD.

Two observations emerge from Chart 3. First, the full model reduces the gap in earnings premiums more than does the restricted model. Second, the difference is most pronounced when migrants to Toronto are compared with stayers. As noted above, the least sensitive results are those where the earnings premiums of migrants to Toronto are compared with the

premiums of other migrants. This comparison, therefore, is the focus of the propensity score matching results reported for the LAD.

Chart 3
Relative income gains from migration to Toronto, compared with income gains of other migrants and of people who did not move, by extent of control for conditioning variables, population aged 20 to 29



Note: ATT is average treatment (migration) effect on the treated (people who moved).
Source: Statistics Canada, Survey of Labour and Income Dynamics.

Analysis based on the LAD data reinforces the income benefits of migration for 20- to 29-year-olds that emerged in the SLID-based analysis. Although the number of covariates potentially associated with migration and income is reduced, the LAD provides greater longitudinal detail and sample size. Again, those who moved to Toronto are contrasted with those who moved to elsewhere. Migration-income effects are based on: (i) the difference in income levels one, five and seven years pre- and post-migration; (ii) the difference in average income *growth rates* five and seven years pre- and post-migration; and (iii) the difference in average income measured five and seven years pre- and post-migration, with selected models presented. In each case, total individual income was used, and migrants were identified by change in location from one year to the next.[8]

Table 6 reports the results of the logistic analysis of the likelihood of migration based on the LAD, and Table 7 reports the propensity score matching results based on these same three models. All models contrast migrants to Toronto with other system migrants and stayers, but differ on the income measure used. Again, findings are consistent with expectations. While there was no difference by age in young adults' propensity to migrate to Toronto rather than to other areas, males and French-speakers were less likely to do so. Not surprisingly, immigrants were more likely to migrate to Toronto. Single-parent households and couples with and without children were also less likely to migrate to Toronto, compared with people who were single or

8. Individual market income was also modeled, with similar results. Results are available from the authors.

lived in other types of household. Origin was also important—except for Edmonton residents, young adults were more likely to move to Toronto than to other destinations.

Table 6
Coefficients relating selected characteristics in Longitudinal Administrative Databank (LAD) to propensity to migrate to Toronto, based on samples used to construct Models assessing effect of migration on income, population aged 20 to 29

	Model 1		Model 2		Model 3	
	coefficient	p-value	coefficient	p-value	coefficient	p-value
Constant	-2.652	0.001	-2.643	0.001	-3.053 *	0.007
Male	-0.133 *	0.001	-0.123 *	0.002	-0.116 *	0.007
Aged 21	-0.292	0.655	-0.250	0.703	-0.214	0.863
Aged 22	-0.341	0.568	-0.356	0.552	0.241	0.835
Aged 23	0.089	0.877	0.090	0.876	0.537	0.637
Aged 24	0.074	0.897	0.069	0.904	0.442	0.698
Aged 25	0.157	0.784	0.145	0.799	0.509	0.654
Aged 26	0.853	0.881	0.090	0.875	0.441	0.698
Aged 27	0.200	0.726	0.199	0.727	0.551	0.628
Aged 28	0.119	0.836	0.099	0.862	0.483	0.671
Aged 29	0.183	0.750	0.169	0.768	0.549	0.671
Immigrant	0.853 *	0.001	0.856 *	0.001	0.788 *	0.000
French	-3.484 *	0.001	-3.475 *	0.001	-3.451 *	0.000
Couple with children	-1.184 *	0.001	-1.182 *	0.001	-1.129 *	0.000
Couple without children	-0.299 *	0.001	-0.303 *	0.001	-0.278 *	0.000
Single parent	-0.872 *	0.001	-0.860 *	0.001	-0.908 *	0.000
Starting income	0.001 *	0.001	0.001 *	0.001	0.000 *	0.000
From Ontario	2.996 *	0.001	2.994 *	0.001	2.998 *	0.000
From Ottawa-Gatineau	2.313 *	0.001	2.311 *	0.001	2.269 *	0.000
From Calgary	0.538 *	0.001	0.544 *	0.001	0.552 *	0.001
From Edmonton	-0.246	0.150	-0.236	0.168	-0.428 *	0.034
From Vancouver	0.671 *	0.001	0.653 *	0.001	0.529 *	0.000
From other large census metropolitan areas	2.190 *	0.001	2.184 *	0.001	2.195 *	0.000
From medium urban area	1.929 *	0.001	1.910 *	0.001	1.949 *	0.000
From small urban area	0.933 *	0.001	0.918 *	0.001	1.002 *	0.000

	Model 1		Model 2		Model 3	
Diagnostic statistics						
Number of observations	30,700	...	30,400	...	26,600	...
Likelihood ratio	4,554.830	...	4,466.700	...	3,902.810	...
Pseudo r-squared	0.211	...	0.210	...	0.212	...

* significant at p<0.05; p-values 0.001 are equal to 0.001 or less.
Note: Models 1, 2 and 3 differ based on difference in the samples used to estimate income pre- and post-migration.
Source: Statistics Canada, Longitudinal Administrative Databank.

The analysis shows a substantial premium for migrants to Toronto when incomes one and five years pre- and post-migration are compared (Table 7). For instance, just one year after moving, migrants to Toronto received an income premium of $8,600, compared with migrants to other destinations. Moreover, the advantage persisted: when incomes five years pre- and post-migration are considered, migrants to Toronto had a premium of nearly a $16,500. Results are similar for the seven-year window (data not shown).

Despite the immediate post-migration effect in income *level*, the results do not show a significant effect in terms of income *growth rates*. That is, once in Toronto, migrants' income growth rate was not significantly faster (relative to their pre-migration income growth rate) than that of young adults who migrated elsewhere. Thus, again, the increase in income associated

with migration to Toronto does not appear to reflect learning effects, but only a productivity effect.

Table 7
Propensity score matching estimates of effect of migration to Toronto on earned income relative to other migrants, population aged 20 to 29

Model	Income effect	t-stat
Model 1 - difference in income 1 year pre- and post-migration (dollars and percent)	8,583	24.60
Model 2 - difference in 5-year growth rate pre- and post-migration (percent)	-0.21	0.12
Model 3 - difference in average income 5-years pre- and post migration (dollars and percent)	16,541	28.90

Source: Statistics Canada, Longitudinal Administrative Databank.

5 Conclusion

The objective of this paper was to explore Toronto's role as a potential escalator region in the Canadian economy, evaluated through the wage gains or differences of migrants into Toronto versus migrants to other destinations in the Canadian urban hierarchy and those who did not migrate. Overall, the results are suggestive that Toronto functions as an escalator region, with the metropolitan area benefiting from high in-migration rates among young labour force migrants, and with a corresponding net loss amongst older age groups and at retirement. Moreover, and consistent with both the escalator theory and wage growth theory, migration into Toronto is associated with an income premium, such that in-migrants appear to immediately receive an income benefit that exceeds the income benefits associated with migrations to other urban areas, and/or staying. That is, while migrations to other large, medium or small urban areas are also often associated with income benefits, the benefits of migrating to Toronto appear to be greater. Wage gains or income differences for migrants into smaller urban areas are, in general, modest, and may be coincident with job changes, an effect that has also been associated with wage premiums (Topel and Ward 1992). In effect, it would appear that income growth was accelerated by migrating into Toronto – a productivity effect. There is less evidence that there is an additional learning effect. While this is perhaps counter to some results in the literature, it may reflect the potentially longer period over which income benefits associated with learning effects must be recognized, while productivity effects are much more immediate.

Two outstanding questions remain. First, why have we not identified a strong learning effect when other researchers (e.g., Glaeser, 1999; Glaeser and Maré 2001) have found one? The answer remains somewhat elusive. It may be, for instance, that only certain types of workers benefit from migration and the learning effect is being averaged out across the broader migrant pool. Alternatively, it could be that places act as escalators for particular occupations and industries, meaning that Toronto acts as an escalator for some and not for others. However, the identification of which occupations and industries (and in what locations) are more prone to witnessing the escalator effect in Toronto is left for other research. On a related note, the migration literature clearly notes that one partner in a dual earner household typically benefits from migration, while the other partner experiences disruptions to both earnings and participation. Finally, the difference-in-difference estimator and propensity score matching procedures further eliminates biases in the estimation, again possibly smoothing out the learning effect.

Second, why do Toronto's in-migrants receive such positive wage benefits, exceeding those of migrants into other urban areas. The existing literature points to a set of potential reasons, including increased productivity, premiums associated with the demand for specialized skills, the ability to provide better labour matching, and the concentration and diversity of high order managerial and professional functions found within large urban areas. But, which factor(s) plays a more important role in setting wage levels? This will be the focus of future research.

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